



## Investigation of Adrenaline, Nor-Adrenaline and Complete Blood Count in Nursing Students with Stress at First Clinical Experience

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### Abstract

The first clinical experience for nursing students can be stressful. The students expressed feelings of irritability, distress and concern due to reasons such as not being ready for clinical experience, thinking they have inadequate clinical skills, unsupportive health professional staff and clinical learning environment, concerns over patient safety.

**Objectives:** To identify the level of adrenaline, nor adrenaline and complete blood count among the nursing students before and after their first clinical experiences; to identify the level of stress among the nursing students before and after their first clinical experiences and to determine association among stress, complete blood count, adrenaline and nor adrenaline hormonal level.

**Materials and methods:** A cross-sectional descriptive and quasi-experimental design was designed to investigate the adrenaline, non-adrenaline level, Complete Blood Counts, and their association with stress in nursing students before and after the first clinical experience by using Enzyme Linked Immuno-Sorbent Assay (ELISA) technique and utilizing self-report questionnaire. A non-probability sample (Convenience) of (71) students was taken in present study. The period of the study is from January / 2017 to March / 2017.

**Results:** The current study was determined that the majority of the age group at age category  $\leq 20$  by about (84.5%). Regardless of gender, female was more than male (77.5% and 22.5%) respectively. The level of education was mostly at secondary school (97.2%). Additionally, urban was more than rural (78.9% and 21.1%) respectively and the studied group was mostly enough income (54.9%). For marital status, single more than married (94.4%).

Furthermore, the mean and standard deviation of blood tests and hormones level were different before and after the first clinical practice of the nursing students. The statistical results were significant for White blood cells (WBCs), and Hemoglobin (Hb), while highly significant for Lymphocytes (LYM), Mean corpuscular volume (MCV), Red blood cells (RBC), Mean corpuscular hemoglobin (MCH), Mean corpuscular hemoglobin concentration (MCHC), Platelets (PLT), Adrenaline and nor-adrenaline. The levels of all above blood test parameters were slightly decreased except adrenaline and nor adrenaline where increase, however these results were statistically significant. The stress was increased after first clinical practice by about (57.7%). However the statistical result was significant (P-value=0.03%).

**Conclusion:** The study concluded that the stress state in nursing students was affected by the first clinical experience and increase hormonal level (Adrenaline and nor-adrenaline) and decrease blood cell count when stress increased.

**Keywords:** Stress, Nursing student, Clinical practice stress, Complete blood count report, Hormonal level (Adrenaline and nor-adrenaline).



## INTRODUCTION:

Nursing education includes both practical and theoretical education to give a comprehensive understanding of human being and the external and internal environment surrounding them and to solve different problem that may happen in interaction [1].

In particular, clinical practice is an essential course in which they are not only allowed to get practical knowledge and experiences need in nursing education in addition to theoretical education, but also get attitudes, values, and professional pictures needed of nurses and acquire duty [1].

Nursing training is a stressful process. Nursing students face both psychosocial and physical risks such as job stress at work during the training time. Because they have clinical duties related to patient care in clinical environments, they experience similar stressors as professional nurses' experience. Nursing students have both internal and external stress sources related to the clinic environment, theoretical training, social life, and personal traits. The sources of stress that are part of the vocational training affect nursing students in many ways [2]. In several studies investigating the perceived stress levels of nursing students, it was found that they had higher stress levels and stress sources [3-5]. The first clinical experience for nursing students can be stressful. The students expressed feelings of irritability, distress and concern due to many reasons such as not being ready for clinical experience, thinking they have inadequate clinical skills, unsupportive health professional staff and clinical learning environment, concerns over patient safety [2]. Nursing students may experiences clinical practice stress because of the unfamiliar environments of clinical locations, anxiety and fear about errors during the practice, excessive tasks, limited knowledge and role conflicts, limitations in the clinical applications of theories they have educated at school, unpredictable crisis situation, interpersonal relationship with the patients and their caregivers, and so on [6]. Therefore, the aim of current study was to investigate the adrenaline, non-adrenaline, complete blood count, and their association with stress in nursing students before and after first clinical experience.

## Materials and Methods:

A cross-sectional descriptive and quasi experimental was designed to seek for plans to identify the level of adrenaline, nor adrenaline and complete blood count among the nursing students with stress before and after their first clinical experiences by using Enzyme Linked Immuno-Sorbent Assay (ELISA) technique and utilizing self-report questionnaire. The period of the study was from January / 2017 to March/ 2017. The non-probability (Convenience) sample of (71) students were taken in the current study. The study was achieved in Medical Al-Sadar City and Faculty of Nursing/ University of Kufa at Al-Najaf province. The researchers have adopted the following tool to investigate the adrenaline, non-adrenaline, complete blood count, and their association with stress, in nursing students before and after first clinical experience. The sample consists from the following parts:

### Part (I) Serological Laboratory Analysis:

Antecubital venous blood (5 ml) was drawn from each subject; (2 ml) was put in EDTA tubes for measuring complete blood count by Humacount 30<sup>TS</sup> (an Hemo-analyzer) and (3 ml) was placed in plain serum tubes . Sera were separated by centrifugations at 3000 rpm for 10 minutes and afterward, it put away at -20°C preceding further testing. All sera tubes were permitted to thaw once (repeated thawing was avoided). All stored sera were tested with adrenaline/nor adrenaline ELISA kit (Code: KA1877) which is a quantitative ELISA test for detection of circulating adrenaline/nor adrenaline (provided by Abnova, USA).

### Part (II) Student's demographic data form and the questionnaire:

URL: <http://www.uokufa.edu.iq/journals/index.php/ajb/index>  
<http://iasj.net/iasj?func=issues&jid=129&uiLanguage=en>  
 Email: [biomgzn.sci@uokufa.edu.iq](mailto:biomgzn.sci@uokufa.edu.iq)



A questionnaire was used to determine student's stress, which is comprised of 14 items [7]. The investigator translated the Phobia's scale from English to Arabic. The validity of Translation was performed through forward and backward translation process, then forward to the experts to review the translation expert.

**Statistical Analysis:** Paired t-test and chi-square were used for statistical analyses to show if there is any significant difference between results.

**Results:**

Table (1): Observed Frequencies and Percentages for Demographical Characteristics.

Category		Frequency	Percent %
Age Group (years)	<= 20.00	60	84.5
	> 20	11	15.5
Gender	Male	16	22.5
	Female	55	77.5
Educational level	Secondary	69	97.2
	Institute	2	2.8
Residence	Rural	15	21.1
	Urban	56	78.9
Marital status	Single	67	94.4
	Married	4	5.6
Income	Enough	39	54.9
	Enough to some extant	25	35.2
	Not enough	7	9.9
Total		71	100%

Table (1) shows that the majority of the age group at age category <=20 by about (84.5%). Regardless of gender, female was more than male (77.5% and 22.5%) respectively. The level of education was mostly at secondary school (97.2%). Additionally, urban was more than rural (78.9% and 21.1%) respectively and the studied group was mostly enough income (54.9%). For marital status, single more than married (94.4%).

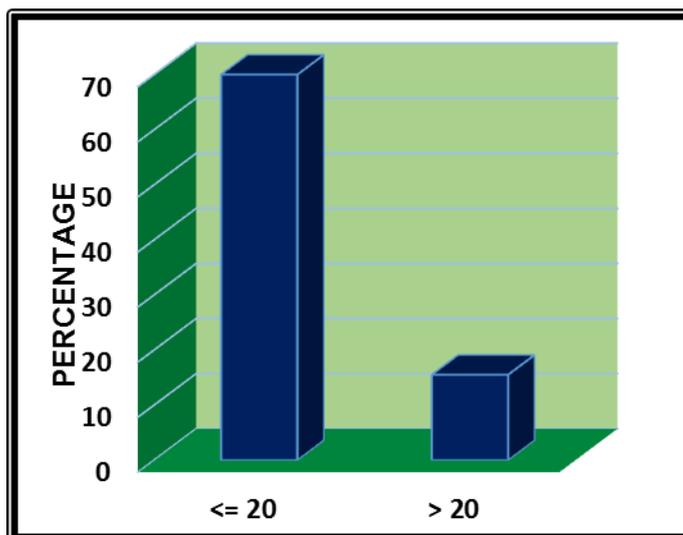


Figure (1): Bar chart of Age group distribution

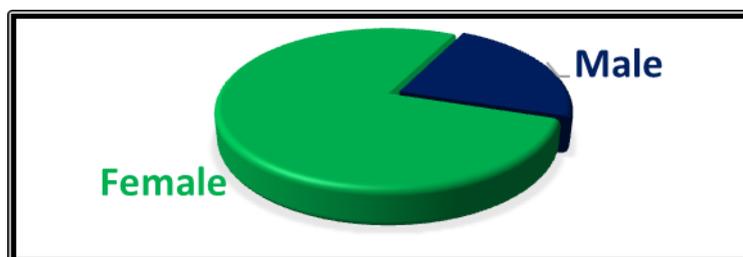


Figure (2): Bar chart of Gender distribution.

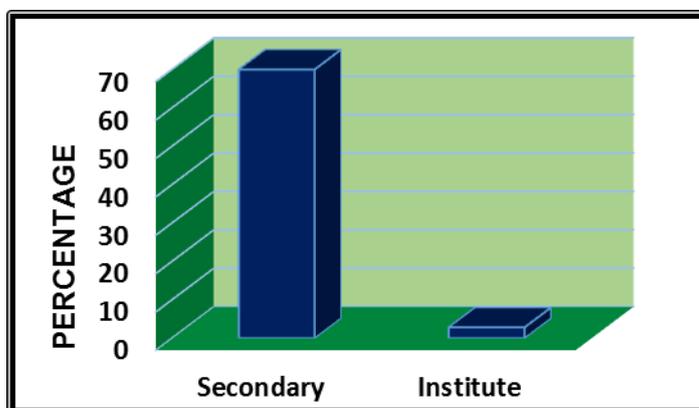


Figure (3): Bar chart of level of education distribution.

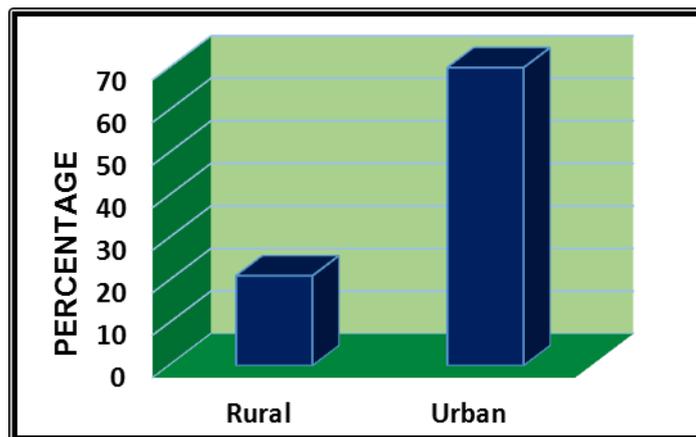


Figure (4): Bar chart of residence distribution.

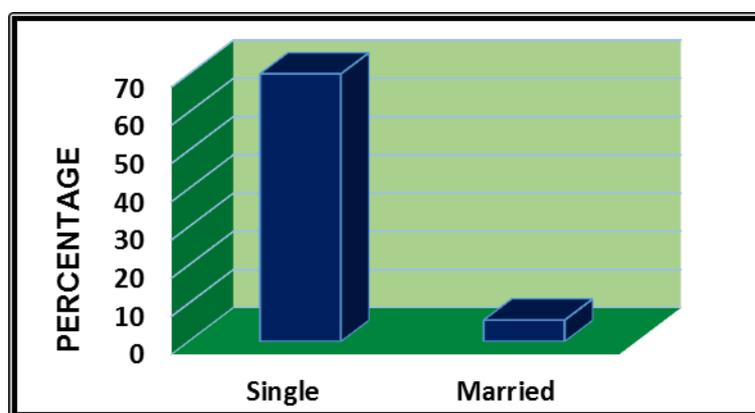


Figure (5): Bar chart of marriage status distribution

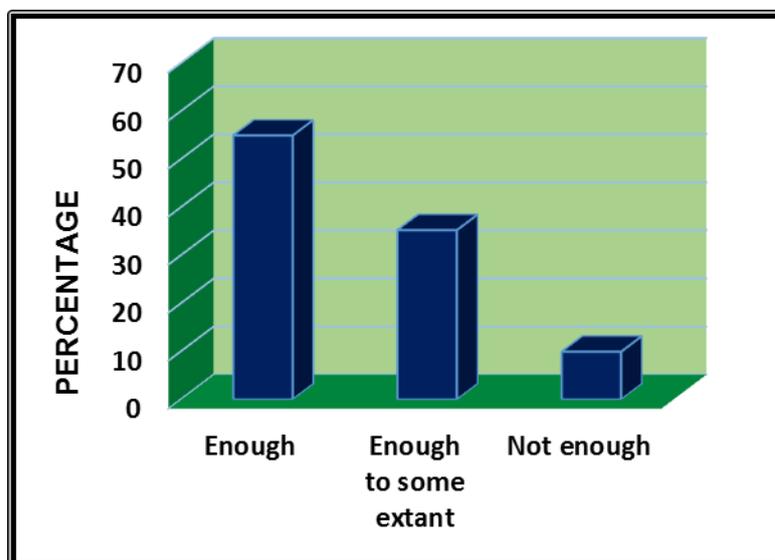


Figure (6): Bar chart of income distribution



Table (2): Comparison of complete blood count and hormones level before and after first clinical practice using statistical paired t- test.

Blood Tests	Before	After	95% Confidence Interval of the Difference		P-value (Sig.)
	Mean $\pm$ SD	Mean $\pm$ SD	Lower	Upper	
WBC	7.14 $\pm$ 2.81	6.27 $\pm$ 2.47	0.01	1.73	0.046 (S)
LYM	2.48 $\pm$ 1.38	1.27 $\pm$ 0.43	0.88	1.54	0.0001 (HS)
MON	0.40 $\pm$ 0.35	0.32 $\pm$ 0.14	-0.01	0.16	0.110 (NS)
GRA	4.23 $\pm$ 1.54	4.67 $\pm$ 2.34	-1.05	0.16	0.154 (NS)
RBC	8.50 $\pm$ 1.78	6.75 $\pm$ 1.26	1.24	2.24	0.00001 (HS)
Hb	19.19 $\pm$ 2.88	18.01 $\pm$ 2.92	0.19	2.16	0.019 (S)
MCV	79.73 $\pm$ 9.10	88.63 $\pm$ 6.40	-11.03	-6.77	0.0001 (HS)
MCH	23.14 $\pm$ 3.30	26.90 $\pm$ 2.44	-4.57	-2.93	0.0001 (HS)
MCHC	28.99 $\pm$ 1.32	30.29 $\pm$ 0.97	-1.66	-0.92	0.00001 (HS)
PLT	7343.64 $\pm$ 3219.45	3700.29 $\pm$ 1766.91	2741.08	4545.61	0.0001 (HS)
Adrenaline	76.10 $\pm$ 8.38	123.81 $\pm$ 32.19	-55.78	-39.64	0.0001 (HS)
Nor-adrenaline	431.25 $\pm$ 78.60	606.39 $\pm$ 73.15	-201.85	-148.42	00.0001 (HS)

*WBCs: White blood cells, Hb: Hemoglobin, LYM: Lymphocytes, MON: Monocytes, GRA: Granulocytes, RBCs: Red blood cells, MCH: Mean corpuscular hemoglobin, MCV: Mean corpuscular volume, MCHC: Mean corpuscular hemoglobin concentration, PLT: Platelets, S: Significant, HS: High Significant, NS: None significant.*

Table (2) shows the mean and standard deviation of blood tests and hormones level before and after first clinical practice of the nursing students. The statistical results were significant for White blood cells (WBCs), and Hemoglobin (Hb), while highly significant for Lymphocytes (LYM), Red blood cells (RBC), Mean corpuscular hemoglobin (MCH), Mean corpuscular volume (MCV), Mean corpuscular hemoglobin concentration (MCHC), Platelets (PLT), Adrenaline and nor-adrenaline. The levels of all above blood test parameters were slightly decreased except adrenaline and nor adrenaline where increase, however these results were statistically significant.



Table (3): Comparisons of stress state before and after first clinical practise using chi-square test.

Categories		Before		After		Sig.	O.R.
		Frequency	Percent %	Frequency	Percent %		
Stress	Yes	28	39.4	41	57.7	$X^2= 4.731$ df=1 P-value=0.03 (S)	0.47
	No	43	60.6	30	42.3		
Total		71	100	71	100		

$X^2$ : chi-square, *df*: degree of freedom, *O.R.*: odd ratio, and *S*: Significant.

Table (3) shows relationship of stress state before and after first clinical practice of the nursing students. The stress was increase after first clinical practice by about (57.7%).The statistical result was significant (P-value=0.03).

Table (4) Causes-relationship between stress and age groups.

Categories		Stress		Total	Sig.
		Yes	No		
<= 20	No.	38	22	60	$X^2=4.954$ df=1 P-value=0.026 (S)
	%	92.7%	73.3%	84.5%	
> 20	No.	3	8	11	
	%	7.3%	26.7%	15.5%	
Total	No.	41	30	71	
	%	100.0%	100.0%	100.0%	

$X^2$ : chi-square, *df*: degree of freedom, and, *S*: Significant.

Table (4) shows relationship between stress and age group. The stress was increase when the student's age <=20, however the statistical results was significant (P-value=0.026).

Table (5) causes relationship between stress and other demographic data.

Category	$X^2$	df	P-value (sig.)
Gender	1.025	1	0.311 (NS)
Educational level	1.506	1	0.220 (NS)
Residence	0.152	1	0.697 (NS)
Marital status	0.104	1	0.747 (NS)
Income	3.119	2	0.210 (NS)

$X^2$ : chi-square, *df*: degree of freedom, and, *NS*: None Significant.



Table (5) shows relationship between stress and demographic data, the results were not statistically significant for gender, educational level, residence, marital status and income.

### Discussion:

The key level of meanings of the experiences related to the clinical practice of nursing students could be reflected from the parts of temporality, physicality, relationality and spatiality. The primary focuses of the current discussion, are the experiences of the nursing students (participants) which should pick up attentions in nursing educations and the association of stress with adrenaline, non-adrenaline, and complete blood count before and after first clinical practices. The nursing students, as they first embarked on clinical practices, felt a sense of being overwhelmed by the clinical environments despite the professor-in-charge providing orientation regarding the overall clinical practice and real practice environments. In a clinic domain, due to the shock from vague boundaries, and an unfamiliar atmosphere, apathy of health professionals or patients and difficulty of communication problems, condescending attitude, etc., there can be corporeal, spatial, temporal, and relational difficulties such as “the first encounter with serious ad awkward situation”, “an obstruction-like being”, “nurses who are not worthy of emulation”, and “any place with uncomfortableness”. These findings were agreement with the results of other studies in Turkey and Iran [8, 9] that reported about the stress, communication problems and anxiety of participants in the initial clinical practice environments. In another study, Korean nursing students also experienced loss of human dignity and confusions of reality shock in their clinical learning [10]. In addition to factors such as practice preparations and the clinical environment, the nursing students in present study identified cultural and institutional aspects that influence their experience. The current study was determined that the majority of the age group at age category  $\leq 20$  by about (84.5%). Regardless of gender, female was more than male (77.5% and 22.5%) respectively. The level of education was mostly at secondary school (97.2%). Additionally, urban was more than rural (78.9% and 21.1%) respectively and the studied group was mostly enough income (54.9%). For marital status, single more than married (94.4%).

Furthermore, the mean and standard deviation of blood tests and hormones level were different before and after the first clinical practice of the nursing students. The statistical results were significant for White blood cells (WBCs), and Hemoglobin (Hb), while highly significant for Lymphocytes (LYM), Red blood cells (RBC), Mean corpuscular hemoglobin (MCH), Mean corpuscular volume (MCV), Mean corpuscular hemoglobin concentration (MCHC), Platelets (PLT), Adrenaline and nor-adrenaline. The levels of all above blood test parameters were slightly decreased except adrenaline and nor adrenaline where increase, however these results were statistically significant. The stress was increased after first clinical practice by about (57.7%). However the statistical result was significant (P-value=0.03%).

The current study are agreement with other study's results in that the first clinical experience considered stressful condition for the nursing students [11,12]. Perhaps, one reason is that lower academic level students are regularly more youthful in age. Research exercises have demonstrated that types of stressors vary with increasing age. It appears that humans gain experience as they grow old and these and other people experience can decrease various types of stress such as job and educational status. Exposure to stressful situation and new environment and behavior are among important stressful experiences in novice nurses. The first clinical experiences on a new ward has been identified as a sources of stress and anxiety for nursing students. When participants encountered a new clinical rotation, they described feeling of stress associated with the fear of unknowing what to expect and the discomfort of becoming familiar with the new clinical site. Many studies reported that nursing students perceived the interactions with faculty and staff members as a significant source of stress in the



clinical learning environment. Actions of clinical faculty members that have been perceived by nursing students as stressful included clinical evaluations, being observed, incompetent or moody behavior, and waiting on the clinical instructor [13].

Another source of stress reported by nursing students was feelings that they loss professional knowledge's and skills. For example, some students have described being uncertainty of their abilities to do special nursing skill on many patients. Whereas other students have, expressed feeling stressed due to their lack of confidence in their abilities to competently deal with new. Students' feeling of fear of making mistakes and causing harm to patient was another source of stress. Some of the most important problems of nursing training were theory-practice gaps, lack of time and lack of communication [13]. They are not knowing how to assist patients with physio-psycho-social issues, and stress over not being trusted or acknowledged by patients or patients' families and they might be student's fear of infection transportation. It can be another source of stress. When stress condition occurs in initial period events which called fight /flight , one of the most affected process is metabolism process the liberate more adenosine triphosphate (ATP) that may be indirectly affected on bone marrow and minimize the cells production [14].

Previous researches conducted and documented that some white blood cells such as monocytes and lymphocytes recruited and migrate to most affected organs from stressful conditions results in battle field at a particular or that organ. This situation mostly seen in acute stress cases. Additionally, the current study observed that elevation level of adrenaline and nor-adrenaline increase several biological process of our body such as metabolism, respiratory rate and heart rate that lead to increase oxygen level (hyperoxia). It may be due to the negative feedback of hyperoxia that lead to diminish the secretion of erythropoietin from kidneys that subsequently decrease stimulation of bone marrow to produce blood cells [15].

### **Conclusion:**

The present study results concluded that:

- 1- The stress state in nursing students was affected by first clinical experience and it was influenced by the age.
- 2- Increase hormones level (Adrenaline and nor-adrenaline) and decrease blood cells count when stress increased.

### **Recommendations:**

- 1- We recommended that clinical faculty use mentors that are in a higher level of the program than mentees. The mentors and mentees meet prior to the experience to establish a rapport that clinical faculty consider the time requests of the guides and work with them to lighten any issues.
- 2- Nursing faculty may be need to take a moment to reflect on their teaching behaviors so that they can first understand how students are perceiving their teaching behaviors and then make a conscious and deliberate effort to modify their teaching behaviors so that they can be more intentionally inviting in their teaching practices.
- 3- Encouraging group work and collegiality amongst students in the simulation lab, and by motivating clinical faculty and students to share the responsibility of learning.
- 4- We recommended the nursing students to take good nutrition before clinical practice, use protective equipment's, apply sterile technique and take vaccines.



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